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THE LOGIC OF JUDGMENTS OF PRACTISE

III. Sense-Perception as Knowledge

I have mentioned incidentally, in my former article, that it is conceivable that the failure to give adequate consideration to the logical form of practical judgments may have a compromising effect upon the consideration of other forms.[1] I now intend to develop this remark with regard to sense-perception as a form of knowledge. The topic is so bound up with a multitude of perplexing psychological and epistemological traditions that I shall have first to make it reasonably clear what it is and what it is not which I propose to discuss. I endeavored in an earlier series of papers[2] to point out that the question of the *material* of sense-perception is not, as such, a problem of the theory of knowledge at all, but simply a problem of the occurrence of a certain material—a problem of causal conditions and consequences. That is to say, the problem presented by an optical image[3] of a bent stick, or by a dream, or by "secondary" sensory qualities is properly a problem of physics—of the conditions of occurrence, and not of truth or falsity, fact or fiction. That the existence of a red *quale* is dependent upon disturbances of a certain velocity of a medium in connection with certain changes of the organism is not to be confused with the notion that red is a way of knowing, in some more or less adequate fashion, some more "real" object or of knowing itself. The fact of causation—or functional dependence—no more makes the *quale* an "appearance" to the mind of something more real than itself or of itself than it makes bubbles on the water a real fish transferred by some cognitive distortion into a region of appearance. With a little stretching we may use the term "appearance" in either case, but the term only means that the red *quale or* the water-bubbles is an *obvious* or conspicuous thing from which we infer something else not so obvious.

[1] See this Journal, Vol. XII., page 506.

[2] See this Journal, Vol. VIII., page 393 in an article entitled "Brief Study in Realism."

[3] I use the term image in the sense of optics, not of psychology.

The position which I have freely resumed here was not, however, adequately guarded on all sides. It implies that the question of the existence or presence of the *subject-matter* of even a complex sense perception may be treated as a question of physics. It also implies that the *existence* of sense perception may be treated as a problem of physics. But the position was also taken to imply what I did not mean—that *all* the problems of sense-perception are exhausted in this mode of treatment. There is still, on the contrary, the problem of the cognitive status of sense perception. So far from denying this fact, I meant rather to emphasize it in showing that this knowledge aspect was not to be identified—as it has been in both realistic and idealistic epistemologies—with the simple *occurrence* of presented subject-matter and with the *occurrence* of a perceptive act. It is often stated, for example, that primitive sense objects when they are stripped of all inferential material can not possibly be false—but with the implication that they, therefore, must be true. Well, I meant to go this statement one better—to state that they are neither true nor false—that is, that the distinction of true-or-false is as irrelevant and inapplicable as to any other existence, as it is, say, to being five feet high or having a low blood pressure. That this position when taken leaves over the question of sense perception as knowledge, as capable of truth or falsity, was assumed by me, but undoubtedly the assumption was not made sufficiently clear. It is this question, then, which I intend to discuss in this paper.

I

My first point is that some sense perceptions, at least (as matter of fact the great bulk of them), are without any doubt forms of practical judgments—or, more accurately, are terms in practical judgments as these have been defined—propositions as to what to do. When in walking down the street I see a sign on the lamp-post at the corner, I assuredly see a sign. Now in ordinary context (I do not say always or necessarily) this is a sign of what to do—to continue walking or to turn. The other term of the proposition may not be stated or it may be; it is probably more often tacit. Of course, I have taken the case of the sign purposely. But the case may be extended. The lamp-post as perceived is to a lamp-lighter a sign of something else than a turn, but still a sign of something to be done. To another man, it may be a sign of a possible support. I am anxious not to force the scope of cases of this class beyond what would be accepted by any unbiased person, but I wish to point out that certain features of the perceived object, as a cognitive term, which do not seem at first sight to fall within this class, turn out

upon analysis to do so. It may be said, for example, that our supposed pedestrian perceives much besides that which serves as evidence of the thing to be done. He perceives the lamp-*post*, for example, and possibly the carbons of the arc. And these assuredly do not enter into the indication of what to do or how to do it.

The reply is threefold. In the first place, it is easy—and usual—to read back into the sense perception more than was actually in it. It is easy to *recall* the familiar features of the lamp-post; it is practically impossible—or at least very unusual—to recall what was actually perceived. So we read the former into the latter. The *tendency* is for the actual perception to limit itself to the minimum which will serve as sign. But, in the second place, since it is never wholly so limited, since there is always a surplusage of perceived object, the fact stated in the objection is admitted. But it is precisely this surplusage which has not *cognitive* status. It does not serve as a sign, but neither is it *known*, or a term in knowledge. A child, walking by his father's side, with no aim and hence no reason for securing indications of what to do, will probably see more in his idle curiosity than his parent. He will have more presented material. But this does not mean that he is making more propositions, but only that he is getting more material for possible propositions. It means, in short, that he is in an esthetic attitude of realization rather than in a cognitive attitude. But even the most economical observer has some esthetic, non-cognitive, surplusage.[4] In the third place, some surplusage is necessary for the existence of the sign function. Independently of the fact that it may be required to render the sign specific, action is free (its variation is under control) in the degree in which alternatives are present. The pedestrian has probably the two alternatives in mind: to go straight on or to turn. The perceived object might indicate to him another alternative—to stop and inquire of a passer-by. And, as is obvious in a more complicated case, it is the extent of the perceived object which both multiplies alternative ways of acting and gives the ground for selecting among them.[5] A physician, for example, deliberately avoids such hard and fast alternatives as have been supposed in our instance. He does not observe simply to get an indication of whether the man is well or ill, but, to determine what to do, he extends his explorations over a wide field. Much of his perceived object field is immaterial to what he finally does; that is, it does not serve as sign.

[4] That something of the cognitive, something of the sign or term function enters in as a catalyzer, so to speak, in even the most esthetic experiences, seems to be altogether probable, but that question it is not necessary to raise here.

[5] See my article on "Perception and Organic Action," this JOURNAL, Vol. IX., page 645.

But it is all relevant to *judging* what he is to do. We may fairly conclude that sense perception as a term in practical judgment *must* include more than the element which finally serves as sign. If it did not, there would be no perception, but only a direct stimulus to action.[6]

The conclusion that such perceptions as we have been considering are terms in an inference is to be carefully discriminated from the loose statement that sense perceptions are unconscious inferences. There is a great difference between saying that the perception of a shape affords an indication of how to act and saying that the perception of shape is itself an inference. That definite shapes would not be perceived, if it were not for neural changes brought about in prior inferences made on the basis of data which were not as perceived *definite* shapes, is a possibility; it may be, for aught I know, an ascertained fact. Such telescoping of a perceived object with the object inferred from it may be a constant outcome; but in any case the telescoping is not a matter of a present inference going on unconsciously, but is the organic result of a modification occurring in consequence of prior inferences. In similar fashion, to say that to see a table is to get an indication of something to write on is in no way to say that the perception of a table is an inference from sensory data. To say that certain earlier perceived objects not having the character, as perceived, of a table have now "fused" with the results of inferences drawn from them is not to say that the perception of the table is now an inference. Suppose we say that the first perception was of colored patches; that we inferred from this the possibility of reaching and touching, and that on performing these acts we secured certain qualities of hardness, smoothness, etc., and that these are now all fused with the color-patches. At most this only signifies that certain *previously* inferred qualities have now become consolidated with qualities from which they were formerly inferred. And such fusion or consolidation is precisely *not inference.* As matter of fact, such "fusion" of qualities, given and *formerly* inferred, is but a matter of speaking. What has really happened is that brain processes which formerly happened successively now happen simultaneously. What we are dealing with is not a fact of cognition, but a fact of the conditions of occurrence of something.

[6] The superstition that whatever influences the action of a conscious being must have been an unconscious sensation or perception should be summarily dismissed. We are active beings from the start and are naturally, wholly apart from consciousness, engaged in redirecting our action in response to changes in our surroundings. They are *alternative* possibilities, and hence an indeterminate situation, which change direct response into a response mediated by a perception as a sign of possibilities.

Let us apply the results thus far reached to the question of sense "illusions." The bent reed in the water comes naturally to mind. Purely physical considerations account for the refraction of the light in giving an optical image of a bent stick. This has nothing to do with knowledge or with sense-perception—with seeing. It is simply and wholly a matter of the properties of light and a lens. In the past, however, light refracted and unrefracted, has been a constant stimulus to responsive actions. It is a matter of the native constitution of the organism that light stimulates the eyes to follow and the arms to reach and the hands to clutch and handle. As a consequence, certain arrangements of reflected and refracted light have become a sign of the performance of certain specific acts of handling and touching. As a rule, the stimuli and reactions have occurred in an approximately homogeneous medium—the air. The system of signs or indices of action have been based upon this fact and accommodated to it. A habit or bias in favor of a certain kind of inferred action has been set up. We infer from a bent ray of light that the hand, in touching the reflecting object, will, at a certain point, have to change its direction. This habit is carried over to a medium in which the conclusion does not hold. Instead of saying that light is bent—which it is—we *infer* that the stick is bent: we infer that the hand could not protract a straight course in handling the object. But an expert fisherman never makes such an error in spearing fish. Reacting in media of different refractive capacities, he bases his signs and inferences upon the conditions and results of his media. I see no difference between these cases and that of a man who can read his own tongue. He sees the word "pain" and infers it means a certain physical discomfort. As matter of fact, the thing perceived exists in an unfamiliar medium and signifies bread. To the one accustomed to the French language the right inference occurs.[7]

II

So far as I can see, the pronounced tendency to regard the perceived object as itself the object of a peculiar kind of knowledge instead of as a term in knowledge of the usual kind has two chief causes. One is the confirmed habit of neglecting the wide scope and import of practical judgments. This leads to overlooking the responsive act as the other term indicated by the perception, and to taking the perceived object as the whole of the situation just by itself. The other cause is the fact that just because perceived objects are constantly employed as evidence of what is to be done—or how to do something—they become themselves the objects of pro-

[7] Compare Woodbridge, this JOURNAL, Vol. X., page 5.

longed and careful scrutiny. We pass naturally and inevitably from recognition to *observation.* The inference will take care of itself if the datum is properly determined. At the present day, a skilled physician will have little difficulty in inferring typhoid instead of malaria from certain symptoms provided he can make certain observations—that is, secure certain data from which to infer. The labor of intelligence is thus transferred from the inference to the determination of data—but the data are determined in the interests of inference and as parts of an inference.

At this point, a significant complication enters in. The ordinary assumption in the discussion of the relation of perceived objects to knowledge is that "the" object—the real object—of knowledge in perception is the thing which *caused* the qualities which are given. It is assumed, that is, that the other term of a proposition in which a given sense datum is one term *must* be the thing which produced it. Since this producing object does not appear for the most part in ordinary sense perception, we have on our hands perception as an epistemological problem—the relation of an appearance to some reality which it, somehow, conceals rather than leads to. Hence also the difficulties of "reconciling" scientific knowledge in physics where these causes *are* the terms of the propositions with "empirical" or sense perception knowledge. Here is where the primary advantage of recognizing that ordinary sense perceptions are forms of practical judgment comes in. In these the other term is open and above board —it is the thing to be done, the response to be selected. To borrow an illustration of Professor Woodbridge's: A certain sound indicates to the mother that her baby needs attention. If there is error it is not because the sound ought to mean so many vibrations of the air, while as matter of fact it doesn't even suggest air vibrations, but because there is wrong inference as to the act to be performed.

I imagine that if error never occurred in inferences of this sort the human race would have gone on quite contented with inferences of the practical type. However that may be, errors *do* occur and the endeavor to control inference as to consequences (so as to reduce their likelihood of error) leads to propositions where the "object" of the perceived thing is not something to be done, but the cause which produced it. The mother finds her baby peacefully sleeping and says the baby didn't *make* the noise. She investigates and decides a swinging door *made* it. Instead of inferring a consequence, she infers a cause. If she had so identified the noise in the first place, she might only have concluded that the hinges needed oiling.

Now where does the argument stand? The proper control of inference in specific cases is found (*a*) to *lie* in the proper identification of the datum. If the perception is of a certain kind, the

inference takes place as a matter of course; or else it can be suspended until more adequate data are found, and thus error is avoided even if truth be not found. Furthermore (*b*) it is discovered that the most effective way of identifying datum (and securing adequate data) is by inference to its cause. The mother stops short with the baby and the door as causes. But the same motives which made her transfer her inference from consequences to its conditions are the motives which lead others to inferring from sounds to vibrations of air. Hence our scientific propositions about sensory data. They are not, as such, about things to do, but about things which have been done, have happened—"facts." But they have reference, nevertheless, to inferences regarding consequences to be effected. They are the means of securing data which are of a character to prevent errors which would otherwise occur, and to facilitate an entirely new crop of inferences as to possibilities—means and ends—of action. That scientific men should be conscious of this reference or even interested in it is not at all necessary. I am talking about the logic of propositions, not about biography or psychology. If I reverted to psychology, it would be to point out that there is no reason in the world why the practical activity of some men should not be predominantly directed into the pursuits connected with discovery. The extent in which they actually are so directed depends, however, upon social conditions.

III

We are brought to a consideration of the notion of "primitive" sense data. It was for long customary to treat the attempt to define true knowledge in terms of construction from sense data as a confusion of psychology—or the history of the growth of knowledge—with logic, the theory of the character of knowledge as knowledge. As matter of fact, there *is* confusion, but in the opposite direction. The attempt involved a confusion of logic with psychology—that is, it presented a phase of the technique of the control of inference as if it were natural history of the growth of ideas and beliefs. The chief source of error in ordinary inference is an unperceived complexity of the data. That is, perception which is not itself critically controlled fails to present a sufficiently wide scope of data to secure differentia of possible inferences, and it fails to present, even in what is given, lines of cleavage which are important for proper inference. This is only an elaborate way of saying what scientific inquiry has made clear, that, for purposes of inference as to conditions of production, *ordinary* sense perception is too narrow, too confused, too vivid as to some *quales* and too blurred as to some others. Let us

confine our attention for the moment to its confusion. It has often been pointed out that sense qualities being just what they are, it is illegitimate to introduce such notions as obscurity or confusion into them: a slightly illuminated color is just as irretrievably what it is, as clearly itself, as an object in the broad glare of noon day. But the case stands otherwise when the *quale* is taken as a datum for inference. It is not as easy to identify a perceived object *for purposes of inference* in the dusk as in bright light. From the standpoint of an inference to be effected, the confusion is the same as an undue simplification. This simplification has the effect of making the *quale,* as a term of inference, ambiguous. To infer from it is to subject ourselves to the danger of the fallacies of ambiguity which are expounded in the text-books with reference to ambiguity of verbal symbols. The remedy is clearly the resolution, by experimental means, of what seems to be a simple datum into its "elements," that is, into more ultimate simples. This is a case of analysis; it differs from other modes of analysis only in the subject-matter upon which it is directed, viz., something which had been previously accepted as a simple whole. The result of this analysis is the existence as objects of perception of isolated qualities like the colors of the spectrum as that is scientifically determined, the tones of the scale in all their varying intensities, etc., in short, the "sensations" or sense qualities of contemporary psychology text-books or the "simple ideas" of sensation of Locke. They are not prior to sense-perception, but are the material of sense-perception elaborately discriminated.

Note that these simple data or elements are not original psychologically or historically; they are *logical* primitives—that is, irreducibles for purposes of inference. They are simply the most unambiguous and best defined objects of perception which can be secured to serve as *signs.* They are experimentally determined, with great art, precisely because the naturally given, the historical-psychological, objects in perception have been ambiguous or confused terms in inference. Hence they are replaced, by experimental means involving the use of a wide region of scientific knowledge deductively employed, by simpler sense objects. Stated in current phraseology, "sensations" (*i. e.,* qualities present to sense) are not the elements out of which perceptions are composed, constituted, or constructed; they are the finest, most carefully discriminated objects of perception. We do not first perceive a single, thoroughly defined shade, a tint and hue of red; its perception is the last refinement of observation. Such things are the limits of perception, but they are final, not initial limits. They are what is perceived under the most favorable possible conditions; conditions, moreover, which do not present themselves accidentally, but which have to be intentionally

and experimentally established and whose determination involves the use of a vast body of scientific propositions deductively brought to bear.

I hope it is now evident what was meant by saying that the current empirical logic presents us not with a confusion of psychology with logic, but with a wholesale taking of logical determinations as if they were facts of psychology. The confusion was begun by Locke—or rather made completely current through the enormous influence exercised by Locke—and some reference to Locke may be of aid in clearing up the point. Locke's conception of knowledge was logical, not psychological. He meant by knowledge thoroughly justified beliefs or propositions, "certainty," and carefully distinguished it from what passed current as knowledge at a given time. The latter he called "assent," opinion, belief, or judgment. Moreover, his interest in the latter was wholly logical. He was after an art of controlling the proper degree of assent to be given to matters of probability. In short, his sole aim was to determine certainty where certainty is possible and to determine the due degree of probability in the much vaster range of cases where only probability is attainable. A natural history of the growth of "knowledge" in the sense of what happens to pass for knowledge is the last of his interests. But he was completely under the domination of the ruling idea of his time: namely, that *Nature* is the norm of truth. Now the earliest period of human life presents the "work" of nature in its pure and unadulterated form. The normal is the original, and the original is the normative. Nature is both beneficent and truthful in its work; it retains all the properties of the Supreme Being whose vice-regent it is. To get the logical ultimates we have only, therefore, to get back to the natural primitives. Under the influence of such ideas, Locke writes a mythology of the history of knowledge, starting from clear and distinct meanings, each simple, well-defined, sharply and unambiguously just what it is on its face, without concealments and complications, and proceeds by "natural" compoundings up to the store of complex ideas, and the perception of simple relations of agreement among ideas: a perception always certain if the ideas are simple, and always controllable in the case of the complex ideas if we consider the simple ideas and connections by which they are reached. Thus he established the habit of taking logical discriminations as historical or psychological primitives—as "sources" of beliefs and knowledge instead of as checks upon inference.

I hope reference to Locke will not make him a scapegoat. I should not have mentioned him if it were not that this way of looking at things found its way over into orthodox psychology and then back again into the foundations of logical theory. It may be said

to be the stock in trade of the school of empiricist logicians, and (what is even more important) of the other schools of logic whenever they are dealing with propositions of perception and observation. It led to the supposition that there is a kind of *knowledge* which is directly given in simple apprehension (or sense acquaintance) implying no inference and yet basic to inference. The forcing of problems of epistemology into logic is an inevitable consequence. If what is given in sense is taken as a kind of knowledge, one has to raise the problem of the place and office of the organism in its being given or presented: the mind-body problem henceforth haunts the foundations of logic.[8] Moreover, since the propositions of physics can not be found among these simple data and these scientific propositions give us the constitution of nature, we have on our hands the problem of the reconciliation of the "world" of sense-perception and the "world" of science. Shall we take the former as an appearance of the latter? If so, how can we argue from appearance—that is, sense perceptions—to reality? How can we transcend the given which is appearance and infer a reality behind, much less make any verifiable judgments about what it is? Relativism or a psychic idealism are fruits. Or at all events the question of the possible validity of scientific propositions becomes a problem.[9] Moreover, the given in sense varies with the position and structure of the "percipient." Consequently we have the epistemologic problem of the relation of a number of private worlds of knowledge to the one public and impersonal world of science. And so it goes.

IV

I am not trying to discuss or solve these problems. On the contrary, I am trying to show these problems exist only because of the identification of a datum which is determined with reference to inference and for the control of inference, as a knowledge-mode. As against this assumption I point to the following facts. What is actually given as matter of empirical fact may be indefinitely complicated and diffused. As empirically existent it contains already in its giveness functions of inference. Psychologically or historically these are primarily inferences as to what to do in given situations, where the perceived objects supply the signs (indications or evidence), instead of operating, as do unperceived objects, simply as direct stimuli to reactions. The perceived objects never constitute the whole given; they have a context of indefinite empirical extent in which they are set. To control inference it is necessary,

[8] See, for example, Kemp Smith, this JOURNAL, Vol. IX., page 113.

[9] Compare Mr. Russell's discussion of "Our Knowledge of the External World."

however, to analyze the situation—to determine what is data for inference and what isn't. This analysis involves discriminative resolution of what seem to be wholes into more ultimate simples. The resources of experimentation, all sorts of microscopic and telescopic and registering apparatus, are called in to perform that analysis. As a result we differentiate not merely visual data from auditory—a discrimination effected by experiments within the reach of everybody—but institute discriminations of vast multitude of visual and auditory data. Physics and physiology and anatomy all play a part in the analysis. We even carry the analysis to the point of regarding say a color as a self-included object unreferred to any other object. We may avoid false inference by conceiving it not as a quality of any object, but as a product of a nervous stimulation and reaction. That is, instead of referring it to a ribbon or piece of paper we may refer it to the organism. But all this is only a part of the technique of suspended inference. We avoid some habitual inference in order in the end to make a more careful inference.

Thus we escape, by a straightening out of our logic (by avoiding erecting a system of logical distinctions and checks into a mythological natural history), the epistemological problems. We also avoid the contradiction which haunts every epistemological scheme so far propounded. As matter of fact every proposition regarding what is "given" to sensation or perception is dependent upon the assumption of a vast amount of scientific knowledge which is the result of a multitude of prior analyses, verifications, and inferences. What a combination of Tantalus and Sisyphus we get when we fancy that we have cleared the slate of all these material implications, fancy that we have really started with simple and independent givens, and then try to show how from these original givens we can arrive at the very knowledge which we have all the time employed in the determination of the simple sense data!

JOHN DEWEY.

COLUMBIA UNIVERSITY.

INTROSPECTION AS A BIOLOGICAL METHOD

IN reading Professor Woodbridge's stimulating article on the Belief in Sensations,[1] I have been impressed by the fact that the conclusion to which he was led, namely, that sensations are not elements of consciousness in any intelligible sense, finds strong support from the neurological side in the difficulty of finding any cortical

[1] Woodbridge, Frederick J. E., "The Belief in Sensations," this JOURNAL, Vol. X., pages 599–608.

mechanism for performing such functions as the doctrine of simple sensations implies. It is true that biology can not as yet formulate a general schema of the mechanism of consciousness; the same holds true for many of the so-called physiological functions, about which, however, we profess to have acquired a large body of scientific truth. Neurological research has, moreover, yielded many facts which may at least serve to limit the field of future inquiry in this field.

I have recently endeavored to show[2] that there is no neurological mechanism by which simple sensory impulses can reach the cerebral cortex. There is no afferent tract leading into the cortex directly from a peripheral sense organ or from any center within the brain which is "pure," that is, devoted to a single sensory function. On the other hand, every afferent nervous impulse on its way to the cortex is to some extent affected by its passage through the various subcortical correlation centers; that is, it carries a *quale* of central origin. And this same afferent impulse in its passage through the spinal cord and brain stem may, before reaching the cortex, discharge collateral impulses into the lower centers of reflex coordination, from which incipient (or even actually consummated) motor responses are discharged previous to the cortical reaction. These motor discharges may, through the "back-stroke" action, in turn exert an influence upon the slower cortical reaction.

The cortex must, therefore, be thought of as acting through the subcortical reflex mechanisms, not in their stead, and the raw materials of cortical activity are not simple sense data, but highly complex nervous processes which have been elaborated on the reflex or instinctive plane. The efferent cortical discharge must also act through these same reflex mechanisms, whose pattern is largely preformed and innate.

It is commonly believed that the higher conscious processes are related in some way to the cerebral cortex, and this belief rests on as secure a scientific basis as any other physiologically established relation. The essentials of cortical process seem to consist, not in putting raw sense data into relation with each other, but in integrating complex physiological functions which are already under way and directing them by inhibition, reinforcement, or otherwise in the light of the previous experience of the individual (physiological or psychological memory). Whether the cortical centers can initiate any process *de novo* and whether cortical associational activity can be long maintained apart from some sort of subcortical influence are open to question. But even if an affirmative answer be given to

[2] Herrick, C. Judson, "Some Reflections on the Origin and Significance of the Cerebral Cortex," *Journal of Animal Behavior*, Vol. III., pages 222–236.

these questions, it still remains true that the materials with which these processes work have been in last analysis derived from previous sensori-motor processes which have left structural or other vestiges in the cortex. In other words, the cortex is fundamentally an organ of control over various types of interaction between external (environmental) and internal (physiological) processes.

Neurologists who regard the cerebral cortex as in some sense the organ of consciousness will, therefore, support Professor Woodbridge in his contention that simple sensations can not be regarded as elements of consciousness. But when he asks further, "what the objects of consciousness as a matter of fact are," one is inclined to raise the question, Is the search for an "object of consciousness" the wisest road to take? Are not these "objects" (percepts, constructs, ejects, or what-not) themselves part of the conscious process? And should not our attention be directed to the entire process as process rather than to a search for any sort of static elements?

When I first read Professor Dewey's discussion of the reflex circuit[3] he seemed to me to be reasoning in a circle in more ways than one; but upon further reflection I have come to feel that some such cyclic relation as he develops for reflexes is also true on the physiological side for the conscious process, with the environment at one end of the diameter and the cerebral cortex at the other end. Psychologically also the subject and the "object" seem to stand in some such antithetical relation, neither having real existence apart from the other or apart from the total process.[4]

The complex processes involved in human speech exhibit the same cycle of mutually interacting central and peripheral processes. It is not uncommon to find authors who can not compose without the stimulus of the pencil between the fingers to start the cortical machinery of sentence formation, or public speakers whose thoughts refuse to flow in the seclusion of the study, but who think logically and speak fluently on the rostrum before an audience. The objects of thought are not present in the mind at the beginning of utterance, but they grow up within the situation as it develops.[5]

The neurone as a unit of cerebral structure has only a very limited value for certain restricted lines of inquiry. The significant units in neurology are the reflex circuits and other functional connections as tied up into working systems. I wonder if there

[3] Dewey, J., "The Reflex Arc Concept in Psychology," *Psych. Rev.*, Vol. III., page 357.

[4] Herrick, C. Judson, "A Functional View of Nature as Seen by a Biologist," this JOURNAL, Vol. II., pages 428–438.

[5] Pillsbury, W. B., "The Mental Antecedents of Speech," this JOURNAL, Vol. XII., pages 116–127.

are any psychological "elements" which have more than a similarly restricted value. The search for typical *processes* may not give us so simple analytical schemata, but simple schemata are sometimes false charts which lead to shipwreck.

Simple psychological "elements," "objects of consciousness," and the like seem to have been the most cherished idols of the psychologist's faith. If these must be discarded, is everything psychological lost? So it appears to some. In Doctor Watson's recent book on "Behavior"[6] he cheerfully throws out the psychological babe with the bath of metaphysics in which it was so long immersed. In fact, he seems to regard the child as ailing, if not moribund, and to view the empty tub with equanimity.

Whatever may be one's theory of the relation between body and mind, there is no justification for the elimination of introspective data from a comprehensive scheme of things. Possibly the new psychology may learn to get along without consciousness; but biology can not do so, for it is evidently a real factor in at least the higher stages of evolutionary history, and this factor can not be ignored in natural science.

We see in civilized man an organism with an enormous cerebral cortex and with a complex individual culture and social organization which permit of accurate forecasts of future events and cooperative enterprises. Now, even if it should ultimately prove possible to reduce all of these activities to "language habits" or other simple sensori-motor elements (a highly improbable supposition), it still remains true that each individual in these communities has his own subjective experience.

These personal experiences are, in fact, very real things, and to neglect them or brush them to one side as irrelevant epiphenomena is a thoroughly unscientific procedure. They form an integral part of the behavior complex as we know it in ourselves, and that they play some real part in the behavior of other men as this is objectively manifest to us is generally recognized. These are matters of common experience, involving no subtleties of philosophical analysis or metaphysical acumen. We know in the same way that we know other scientifically established facts that changes in bodily state, such as fatigue and various intoxications, are related to definite types of mental process and that mental processes in turn may be similarly related to definite motor acts, such as the shudder of fright and the tears of pity. And I opine that if we were not enmeshed in the web of a mischievous metaphysical tradition which for centuries has darkened counsel by words without knowledge, we should

[6] Watson, John B., "Behavior: An Introduction to Comparative Psychology," New York, 1914.

find that the problems concerning the relation of mind and body offer no difficulties which are fundamentally different from those regarding the relation of any organ and its function, of any object and its properties.[7]

We know no ultimates in science. We do not know the ultimate cause of chemical affinity or gravitation or the ultimate mechanism of a neuro-muscular reflex, and our ignorance of the way in which the association centers of the cerebral cortex operate during the solution of a mathematical problem is of precisely the same order of magnitude. But we do know that falling bodies obey the law of inverse squares, that reflexes follow stimulation in definite lawful patterns, and that the conscious processes are modifiable by various well-known physiological agents.

Such a frankly physiological hypothesis does not, of course, solve all of the problems of mind and body, but it is not contradicted by any scientific facts at present known, and the evidence on the scientific side for regarding consciousness as a function of bodily organization is of exactly the same sort as that for regarding muscular movement or nervous conduction as such a function. It is true that we are not at present able to write an equation of energy transformation with mental process on one side and calories on the other; but we were no better off regarding nervous conduction until Tashiro's recent demonstration of metabolism in nerve fibers.[8]

What may be the precise relation between consciousness and metabolism is, of course, just the problem which is not yet solved. But whether it shall prove that certain kinds of metabolism are manifested in consciousness, just as other forms are manifested objectively as temperature changes, or whether consciousness is some sort of allotropic property which may manifest itself also in the objective way as physicochemical energy transformation, the fact remains that conscious processes are biological realities which can not be ignored in a comprehensive scheme of things. And the biologist can see no reason why they should not be observed in the only way open to him, namely, by introspection.

The genesis and the earliest stages in the unfolding of the psychic life are lost in the haze of our ignorance of the subjective experience of lower organisms and of very young children. Whether there is some sort of consciousness inherent in all living substances, as some

[7] Compare Elliot P. Frost, "Can Biology and Physiology Dispense with Consciousness?" *Psych. Rev.*, Vol. XIX., page 248: "Consciousness is a process in precisely the same sense that osmosis or alimentation is a process."

[8] Tashiro, S., "Carbon Dioxide Production from Nerve Fibers when Resting and when Stimulated; a Contribution to the Chemical Basis of Irritability," *Am. Jour. of Physiology*, Vol. XXXII., pages 107–136. Also, "On the Nature of the Nerve Impulse," *Proc. Nat. Acad. Sci.*, Vol. I., pages 110–114.

maintain, or whether consciousness, like some other functions (such as the ability to maintain a uniformly higher temperature than the environment, to build nests, and to suckle the young after birth), arose at some relatively late period in animal evolution, is at present a purely speculative question. We have not the data at hand for an answer. But it is from every standpoint highly probable that, whenever consciousness appeared, it came as a gradual development out of some preexisting type of function; for the doctrine of continuity of process in evolution is one of the corner-stones of modern biology, to which the current mutation hypotheses form only an apparent exception.

Furthermore, the analysis of the behavior of both lower animals and men speaks unequivocally in favor of regarding consciousness as a positive biological factor in animal evolution, and not as a mere epiphenomenon without causal significance. The series of physico-chemical phenomena in vital processes seems, when analyzed from the physiological standpoint alone, an unbroken closed system of causes and results. Nevertheless, when the widest possible view of the phenomena is taken, it is seen that in human communities, where consciousness is unquestionably present as a factor in the behavior complex, the objective vital manifestations are clearly different from those of the animal or plant communities in which consciousness is believed to be reduced or absent. The criteria of biological efficiency as this is manifested in human communities are far too complex to be analyzed by any physico-chemical standards now at our command; but when these phenomena in their aggregate are measured by the standard of biological efficiency, it is evident that consciousness here is a real factor.

We know that certain complex activities of the human nervous system may have a twofold manifestation: (1) As relatively simple and measurable physicochemical processes (such as the elimination of CO_2 and the generation of heat); and (2) as subjective experience. And the biological phenomena, when considered in all their aspects, suggest that the latter are as real causative factors in modifying behavior as the generation of heat by muscular work is a cause of an increase in the secretion of perspiration.

The fact that we have no means at our disposal for measuring directly the action of consciousness in terms of energy transformation is no proof that such action does not exist. Let us consider two men who are engaged upon their daily work. One is a laborer turning a windlass for hoisting rock out of a pit for the foundation of a bridge pier; the other is an engineer designing and computing specifications for the steel superstructure to be built upon the finished pier. If the work of each of these men be measured in the

ordinary calorimeter apparatus, it will doubtless be shown that the body of the laborer has expended far more energy than that of the engineer. Nevertheless, when the entire causal sequence is studied, it is evident that the steel bridge can not be erected without the work of the engineer any more than the pit can be dug without the work of the laborer. The causal sequence is as direct and simple in the one case as in the other. It is conceivable that an energy equation might be written in both cases; but the calorimeter can give us a very small part of the total equation in either case, though certainly a larger proportion of the whole in the case of the laborer than in that of the engineer. For upon the engineer and others of the class whom we are wont to call "the intellectuals" the whole burden of the advancement of civilization rests. And it must not be forgotten in this connection that the advancement of human civilization is a biological phenomenon. However necessary it may be to detach special parts of this complex for separate scientific treatment (as in anthropology, ethnology, sociology, psychology, and the like), we err if we do not at the end of our analysis keep in mind the fundamental unity of biological process throughout the whole.

So far as the facts now in hand show, the outstanding differences between a bee-hive, a tribe of savages, and a civilized community can be resolved into differences in the ratio of intelligent to non-intelligent activity in their behavior. The student of animal behavior is, of course, fully justified in leaving consciousness out of account in his study of animal communities and carrying his analysis of objective factors in behavior to its limit. That is the technique of his specialty, and that it is a useful technique has been abundantly shown. But can he rest content with this? Is there not abundant scientific justification for including consciousness as introspectively known among the factors of human behavior (and inferentially of the behavior of some other animals also)? That the data of introspection must be more critically used than has sometimes been done in the past is freely granted, and whether in any given programme of research it is expedient to use these data is a quite different question which must be decided on its own merits in each case.

Professor Pillsbury has recently said,[9] "It is possible to neglect behavior in the study of consciousness, but not to neglect consciousness in the study of behavior." From our present point of view it would seem of doubtful expediency to draw any methodological distinction of this sort between these departments of study. It is a legitimate scientific procedure to isolate for experimental purposes any phenomena from their setting, provided that in the end the cor-

[9] Pillsbury, W. B., "The Function and Test of Definition and Method in Psychology," *Science*, N. S., Vol. XLI., pages 371–380.

responding synthesis is effected. Recent students of animal behavior have shown that much can be gained by ignoring introspective data as far as possible and adhering rigidly to the objective method of investigation. That a very promising field for the study of human behavior is here open is equally evident. But it does not follow that because this method works well in the study of rats and guinea-pigs and of some human activities, therefore introspection under suitable control is a waste of effort. We conclude, then, that, while it is possible and legitimate to neglect consciousness in any particular programme of the study of behavior, it is both inexpedient and unscientific to eliminate the introspective method from the behaviorist's programme as a whole.

On the other hand, it is equally mischievous to assume that because certain useful generalizations can be drawn from a purely introspective study of consciousness, therefore behavior can be neglected in the psychologist's programme as a whole. We have had several centuries of study of this sort of "pure psychology" with results which are generally regarded as unsatisfactorily meager. We are, accordingly, somewhat surprised to see one of the leaders of the new school of animal behavior in America writing an "Introduction to Psychology"[10] whose "sole purpose" is "to aid beginning students in the study of pure psychology," that is, of consciousness as such, quite apart from any bodily or other processes. This is confessedly a pedagogic device, for Professor Yerkes is careful to explain that there is a science of physiological psychology which his pupils may later have an opportunity to discover.

In a special research it is legitimate to use either the introspective or the objective method alone, as Doctor Yerkes has ably illustrated by his own work; but to a layman (who has, however, had considerable experience in teaching other scientific subjects) it would seem that the beginning student in psychology should be given an opportunity to see his science in its setting rather than as a completely detached discipline. In our medical schools we teach anatomy and physiology in separate laboratories and by different instructors, for reasons of practical convenience. But we require the student to study both subjects and we expect him to synthesize the courses so as to know the human body as a working machine. He sometimes fails to effect the synthesis, in which case we regard his courses in both subjects as valueless, no matter how letter-perfect he may be in the content of each taken by itself.

The details of the structure of the nervous system may be out of place in an elementary course in psychology, but the recognition of the fact that there is a functional relationship between the conscious

[10] Yerkes, Robert M., "Introduction to Psychology," New York, 1911.

life and other vital processes is the foundation upon which alone a symmetrical superstructure can be built; and the sooner this can be impressed upon the beginning student the better for him and for the future of science.

The naïve mind has no interest in an "object" apart from its place in the general scheme of things. He asks, What is it for? How does it work? Science has at last caught up with this childlike attitude. By long and painful labor of many centuries we have come to see that purely descriptive studies are not science. We do not in science study bodies apart from their functions, nor disembodied functions. If psychology is to maintain its place among the sciences, it must not isolate itself from the rest of natural process by limiting its interest to pure introspection or to purely objective behavior.[11]

C. JUDSON HERRICK.

THE UNIVERSITY OF CHICAGO.

GREGARIOUSNESS AND THE IMPULSE TO CLASSIFY

WHAT I take to be one of the psychical expressions of that trait so marked in simian species, gregariousness, has recently been termed in ethnological circles the sense of participation, the feeling of being oneself related to what comes into consciousness. This mystical feeling is accompanied, we know, by ideas and impulses which give rise to many forms of conduct and many trains of theory. Magic and religion have hitherto yielded us the most obvious[1] and abundant illustrations of this aspect of mentality. Take the theory and practises of magical contagion, or in religion, the belief in possession and its ritual. For the moment, however, I would indicate how the sense of participation manifests itself in that part of the social organization we sometimes call status, the social categories.

These social categories may be summed up as the categories of age, sex, kin, caste, place-fellowship, friendship. Within the groups which this social differentiation establishes the gregarious instinct is concentrated, to them the sense of participation attaches, around them institutional life revolves, and into them every individual in so far as he is a member of society must fit. Anomalies do, of course, occur, but they are considered unsocial or anti-social,—nuisances or laughing-stocks, perverts, criminals, illegitimates, traitors.

[11] Since writing these lines my attention has been called to Professor Angell's very judicious analysis of this problem, "Behavior as a Category in Psychology," *Psych. Rev.*, Vol. XX., pages 255–270.

[1] The most obvious, because in supernaturalism we have secured a certain degree of that detachment or immunity from the sense of participation which makes rationalism possible.

But social conformity is not the only achievement of the social categories. They are ambitious, nay, greedy. They spread out over quite irrelevant matters, invading regions remote and, one might suppose, recondite. To almost everything sex is imputed—to sun and moon and earth and all things of the earth, animate or inanimate. For the Chinaman nature is divided into two great parts, *yang,* the male principle, embracing light, warmth, life, and *yin,* the female principle, embracing darkness, cold, death. To the Hopi Indian, North, South, and the Above are male; West, East, and the Below, female. In cosmologies seniority is also recognized. The soul of the world was made before the body, asserts Plato's spokesman Timaeus, for never would God have allowed the elder to serve the younger. That "women and other animals were framed from men" Timaeus has no doubt. Nor was it a mere accident that Adam was created before Eve. Caste makes claims, too, without the help of seniority. The head is the lord of the body, says the Greek, and because the front part of the body is more honorable than the back man was given by his creator a forward motion. In blood kinship the heavenly bodies are related, men and animals, species with species. Sun and moon are brother and sister, this species or that are the ancestors of tribe or clan, or its brethren. As for the provinces of language, art, and economy, not alone are they districted out among the differentiated social groups, each province is in itself subject to the societary classification—there is gender, for example, in language; manual labor has less social prestige than mental, art more than handicraft.

In brief, the habit of classifying along the lines the social group has differentiated itself the better to satisfy its own gregarious impulse, this habit recognizes in early cultures few barriers. The social categories color the whole of life. They tend to bring everything into relation with themselves, into their own bounds. Nor are they merely possessive; from their compulsive, imperious character rather are they obsessive.

Given the impulse to classify, the novel, the unclassifiable is disturbing, fearful. Here, may I suggest, is the origin of *mana,* the power imputed by the primitive mind to the mysterious. Fear of *mana,* fear of the unknown, is the feeling aroused by the unclassified, the feeling that the gregarious instinct has been frustrated.

In self-protection, men feel, *mana* must be given a place. Out of the endeavor to classify *mana,* to know it, out of curiosity about *mana,* as it were, arises magic, arises religion. The gods made in the likeness of man are man's successful attempts to categorize *mana,* the fearful unknown. In pantheons like the Greek or the Germanic or the Catholic Christian the classification is carried far—the categories

of sex, seniority, kinship, caste, place-fellowship, and even friendship, the junior category, all are at work.

Religions perish, fear of *mana* is more and more circumscribed, the specific classifications primitive man has made for nature are rejected, even the classifications he has made for himself, for society, are questioned, but the impulse to classify persists; it is the impetus left over, so to speak, from his first impulse for social classification, his earliest attempts to satisfy his gregarious instinct. Out of that instinct develop, we may say, not only scientific methods, but scientific curiosity and the will for scientific research. Science is a fruit of gregariousness.

In conclusion let me ask behaviorists if gregariousness among animals shows any relation to curiosity or to fear of the strange or novel? Are the more gregarious creatures the more curious? Are they more fearful of the unexpected or less? Or, put better, perhaps, are animals less fearful and more curious when they are together?

ELSIE CLEWS PARSONS.

NEW YORK CITY.

REVIEWS AND ABSTRACTS OF LITERATURE

The Man of Genius. HERMANN TÜRCK. London: Adam and Charles Black. 1914. Pp. 463.

Among the new insights into the German mind with which we have been favored this past year, not the least interesting has been the discovery of a certain contemptuous tolerance of morals as a set of rules and principles having jurisdiction only in the secondary affairs of life. It would seem that many Germans of education mean by morality merely the approved, but not rationally obligatory, customs of society. This appears to be Dr. Türck's view; for he says, for example, "Goethe is undoubtedly right when he says that 'the man who acts is always devoid of conscience.'" Yet, curiously enough, much the greater part of the author's book is distinctly ethical; and it is in that field that its chief, if not its sole, excellences are found.

There are, indeed, metaphysical sections; but they are quite uncritical, and rather hamper than further the argument of the book. It seems to be assumed that no enlightened reader will be Philistine enough to challenge the world-transcending Hindu and Neo-Platonic monism, while Spinoza is quoted with something like the naïve reverence of a medieval Thomist citing the Stagirite. Let the following extract—which might well be a modern epitome of one of the Enneads, and which is supported by no argument whatever—serve as a sample:

"God has divided Himself into an infinite number of creatures. He has descended from His infinite greatness, freedom, and perfection, and now lives in a humble form in the atom, in the worm, in man. Yet the

divine element does not renounce its nature even in its humble shape, but strives to return from the multiplicity of finite limited existences to the unity of the highest being, of the most perfect life" (p. 218).

Notwithstanding the expectations naturally aroused by the title, the author gives us no distinctly psychological analysis of the man of genius, but occupies himself almost exclusively with the ethical *conditions* of genius, ethical, that is, in the Anglo-Saxon sense. Taking as his text (frequently reiterated) the statement of Schopenhauer that "*genius* is simply the completest *objectivity, i. e.,* the objective tendency of the mind, as opposed to the subjective, which [latter] is directed to one's own self," Dr. Türck bids us find the secret of genius in the power (and habit) of its possessor of occupying himself with objects and affairs regardless of their bearing upon his selfish interests, and with full surrender to the implications and suggestions of the thing under consideration. The common man is blinded to the subtile, far-reaching, and perhaps inspiring relations of objects because he is obsessed with a persistent concern as to their bearings upon his own little self. He can not, for example, see the real forest, with its biological, esthetic, and metaphysical significance, because of his greedy interest in board-feet and market profits. Selfishness—which, following Schopenhauer, is identified with subjectivity—the author thinks of after the loose fashion of common life. There is no recognition of the fact that the so-called selfish man is really seeking simply certain satisfactions of desire, and is not—or at least is rarely—concerned with his self, is, indeed, full often acting against its best interests. Dr. Türck's thesis is that the man who is completely objective in his interests, who cares for things for themselves regardless of their bearing upon his "selfish" concerns, is able to find in the objects of sense stepping-stones, or, better, successive points of flight for sweeping upon wings of suggestion and insight through the wide domains of the universe. All things are his; in greater or less degree all existence is accessible to him. He is the man of unfettered insight, that is, the man of genius.

His genius may appear in one or more of three forms, according to the part of the conscious life in which this noble objectivity finds scope. (1) If that takes place in the field of perception, he becomes an artistic genius. "To be able to paint with genius," we are told, "one must be able to see with genius. . . . When a bull and a Raphael contemplate the same landscape, the landscape of course remains the same; what is not the same, however, is the impression received by each. . . . A Raphael . . . sees even the most delicate shades of color . . . and all these colors, lights, and lines awaken peculiar, harmonious feelings in his mind" (p. 4). In the forest, for example, "the artist loves the object that he contemplates . . . he is engrossed by the sight of it. . . . He is, indeed, all eye and ear, delighted by the fragment of still-life before him that speaks in so eloquent a language to his heart; he seeks to give expression to his feelings, and thus there arises . . . a poem, a song, a picture, or a marble statue" (pp. 16 ff.). That it is the artist, and not the common man, who thus sees and feels and expresses himself is due to the fact that "among the numerous sense stimulations that reach us simultaneously at any given instant we always make

a selection," and "this selection . . . is directly influenced by man's conscious or unconscious will, by his impulses, inclinations, interests, by his whole character" (p. 10)—that is, by ethical factors in the individual. It is added that "this disinterested absorption in the contemplation of the object is identical with love for the object" (p. 13), and that the man thus objectively interested in (or loving) the objects of the world "recognizes himself in them, and God within him perceives Himself in His world. . . . The artistic genius observes with the eyes and hears with the ears of God" (pp. 14 ff.).

(2) *Philosophical* genius has its seat in the second stage of mental process, that of reflection. It is "objectivity, disinterestedness, love in thinking" (p. 29), thinking in this case being, not the ordinary man's adjustments of plans for realizing "selfish" ends, but the tracing out of the universal and eternal relations of things,—the invisible framework of the universe. Everything, we are assured, is "based on a plan or an idea," and to investigate a thing philosophically "is to comprehend its total idea, . . . to reproduce in one's own mind that plan on which the life and action of the object is founded" (p. 36). "Now, the essential mark of genius is this absorption in the real nature of objects" (p. 37); that is, it is, in Spinozian speech, "the intellectual love of God."

(3) Practical genius, likewise, is rooted in objectivity, but now in the motor field. "The mode of action of the man of genius will consist in doing what he does with all his soul, with a complete devotion to the work itself, be it what it may" (p. 53). Every ulterior end being either absent or subordinate, the activity of genius partakes "of the nature of *play*." "The secret of the all-conquering power of genius lies precisely in the fact it inwardly assumes a free [*i. e.*, "unselfish"] attitude towards its own conduct, and consequently, unhampered by personal consideration, acts with extraordinary energy and boldness. . . . The activity of genius is in the highest sense of the word play, it is free activity, aimless for the man himself like any other game" (p. 83).

Metaphysics apart, these points seem to be well taken. They fall in quite harmoniously, as the author points out, with the teaching of Jesus as to the need of losing one's life in order, in the highest sense, to find it. But what we have offered us is evidently a description rather than a definition of the man of genius. We can not convert the account, and say that every man who attains to any one—or, indeed, to all—of these kinds of objectivity is a genius. He is no doubt a superior man and an admirable one. He is, perhaps, the wise man of the Greek ethical schools; but he is by no means necessarily a genius. No man of ordinary mental endowment could by a lifetime of persistent self-schooling in "objectivity" raise himself to the genius level; for genius connotes a distinctly unusual amount or intensity of power, and not merely the right application of it. The author ignores this rather obvious truth, notwithstanding the fact that the study of "Faust," with which his fifth chapter is taken up, brings him repeatedly to Goethe's references to the "magic" of genius. He sees, indeed, that in the poem "magic is the symbolic expression for the power of genius which gives man a clearer insight and can, so to say, bring about marvels"; yet

the word seems to have no psychological suggestions for him. I think his readers would like greatly to know in what that "*magic*" consists; whether, for example, it lies simply in a heightening and wider organization of the subliminal process of ordinary perception and reflection.

Moreover, even ethically it may be doubted if Schopenhauer's "completest objectivity" is a *sufficient* account of the man of genius; for is not action which is truly self-regarding also characteristic of genius? In the case of the man of action the answer seems so obviously to be in the affirmative that our author is constrained to devote a chapter to the support of his claim that Alexander, Cæsar, and Napoleon were not properly self-seeking men (!), but were men who lived "in the Idea"—Goethe's phrase—the Idea "of the highest, the most perfect state of existence" (pp. 273 ff.). They threw themselves whole-heartedly into certain great plans, fully conscious that these, owing to the manifold contingency of the world, might well prove impossible to realize, but sought them none the less, because they felt impelled to the struggle; they enjoyed the game. The prizes that would go to the winner were so uncertain as to be secondary considerations with them.

Let it be granted that there is force in this consideration, it seems still to be true that, in his own way, the genius is often a self-seeker, a man of keen spiritual appetite and a vehement disposition to self-appropriation. What he looks upon as likely to make for his own self-development—matter of knowledge, for example, and still more suggestions for action—are pounced upon and made his own with little enough hesitation or scruple. Indeed, the distinction between self-seeking and devotion to the objective of which Dr. Türck makes so much is of very doubtful validity. The true distinction appears to be that between small and narrow interests—bodily satisfactions, for example,—and great ones.

Naturally a writer who exalts the centrifugal forces in human nature at the expense of the centripetal, and who honors Christ and Buddha because they are awakeners of "mental freedom" (in his objective sense) is not favorably disposed to the unbounded egoism of Nietzsche and Max Stirner. He is scandalized by Nietzsche's remark that it is "a sign of strong character, *when once the resolution has been taken* [italics mine], to shut the ear even to the best counter arguments,"—which, after all, is substantially the second maxim of the rationalist Descartes—and sees in it only a justification of stupid devotion to selfish interests.

Naturally, too, Lombroso's theory that genius is an abnormal development, an overgrowth of one part of the nature at the expense of other parts, is rejected by Dr. Türck. He criticizes the Italian's logic with much effect, not denying the "law of compensation" *in toto,* but maintaining that Lombroso greatly overworked it in the interest of his theory.

Interesting chapters are devoted to studies of Hamlet, Faust, and Byron's Manfred, in all of which creations the author finds illustrations of his doctrine of objectivity as the secret of genius. The book is excellently made as regards paper, print, and binding.

WILLIAM FORBES COOLEY.

VASSAR COLLEGE.

Essays on the Life and Work of Newton. AUGUSTUS DE MORGAN. Edited, with notes and appendices, by PHILIP E. B. JOURDAIN. Chicago and London: The Open Court Publishing Company. 1914. Pp. xi + 198.

Praise should be accorded to both editor and publishers of this little volume for having made accessible to the general reader De Morgan's three incisive and brilliant essays on Newton, all of which are now very rare. The first essay here reprinted is a sketch of Newton's life which appeared in 1846 in "The Cabinet Portrait Gallery of British Worthies"; the second was written in 1852 for the "Companion to the Almanac," and deals with "Discoveries Relative to the Controversy on the Invention of Fluxions"; the third is a critical review of Brewster's "Memoirs of Newton" (1855), published by De Morgan the same year in the *North British Review.* To the last-named essay the editor has added as appendices an extract from De Morgan's biography of Leibniz which appeared anonymously in 1836, and a fragment from his book "Newton: his Friend: and his Niece" (1885). A very important contribution by the editor, aside from his numerous and valuable notes, is an appendix on the manuscripts and publications of Newton and Leibniz. It contains a list, in chronological order, of the most significant works relating to the memorable controversy about the invention of the differential or fluxional calculus. The student of this controversy will find helpful references to the history of the infinitesimal ideas prior to Newton and Leibniz, to the manuscripts and publications of these two thinkers on the invention of the calculus, and to some of the important works on their controversy.

The essays show De Morgan as a lucid stylist and judicious biographer. Biography for him is no "act of worship." While recognizing that Newton "is the greatest of philosophers, and one of the best of men" (p. 63), his hero is not "*all* hero." Although "the *Principia* would neutralize greater faults than Newton's" (p. 140), De Morgan is at pains to point out the grave defects in Newton's character, chief of which was "a morbid fear of opposition from others" (p. 37). To this "morbid fear" the biographer attributes Newton's treatment of Leibniz, of Flamsteed, and of Whiston, "in each case, a stain upon his memory" (p. 39). And to the same fear is to be ascribed his tendency to keep to himself his great inventions and discoveries. "A discovery of Newton," as De Morgan says, "was of a twofold character—he made it, and then others had to find out that he had made it" (p. 38). Most of his works had to be "extorted" from him by his friends, as it were; his famous views on universal gravitation, for instance, "would have remained his own secret if Halley and the Royal Society had not used the utmost force they could command" (p. 38). Newton seemed to have regarded his researches as ministering to his private satisfaction only, and it appears that "he expected all his discoveries to be received without opposition" (p. 135).

Newton's morbid fear of opposition, coupled with a "morbid suspicion of others," underlay, according to De Morgan, his highly unjust

conduct in his controversy with Leibniz. De Morgan proves at great length, with the aid of unimpeachable documentary evidence, that Leibniz was the independent co-inventor of the differential calculus, called by Newton the method of fluxions. And he goes much further than this when he asserts that, instead of Leibniz having derived any specific information of Newton's discovery, "Newton did derive from Leibniz (without being aware of the extent of his obligation, we think) the idea of the permanent use of an organized mode of mathematical expression" (p. 32). Be this as it may, Newton's entire conduct in the controversy,—the deliberate suppression from the third edition of the *Principia* of the famous scholium in which the independent discovery of Leibniz had previously been acknowledged; the "concoction" of the *Commercium Epistolicum,* for the materials of which De Morgan finds Newton himself as the real source; the unfair dealing with the correspondence that had passed between himself and Leibniz when he heard of the latter's death,—would indeed appear to give abundant proof "of an unhappy temper which sometimes overcame his moral feeling" (p. 45).

The controversy between Newton and Leibniz dominates most of the discussion throughout the essays. The zeal with which De Morgan enters upon his task of clearing Leibniz from the charge of plagiarism may not have entirely been detached in his mind from a subjective interest. He well knew what it meant to have the independence of a discovery questioned. It is interesting to recall that the same year which saw the publication of De Morgan's first essay on Newton also witnessed his controversy with Sir W. R. Hamilton regarding the priority of his own discovery of the logical principle of the quantification of the predicate.

While the clear and judicious analysis of Newton's character and the detailed and fair account of the controversy with Leibniz form the most significant contribution of these essays, both the student of Newton and the general reader will find in them much more that is of interest and value. The frontispiece, from an engraving by E. Scriven of Vanderbank's portrait of Newton, adds to the attractiveness of the volume.

J. LOEWENBERG.

UNIVERSITY OF CALIFORNIA.

A History of Psychology. OTTO KLEMM. Translated by Emil Carl Wilm and Rudolf Pintner. New York: Charles Scribner's Sons. 1911. Pp. xiv + 380.

In 1911 the "History" appeared in German and was reviewed at length in this JOURNAL[1] by Professor R. S. Woodworth. The present reviewer, therefore, finds only a few words necessary in regard to the present translation. Professor Wilm has translated Chapters I.–VI. and Professor Pintner Chapters VII.–XII. There is evidence that much care has been taken and the result is a smooth English, which it is a pleasure to read. There has been a search for the proper translation of the technical terms and where there is the possibility of a misunderstanding the German word is given in parenthesis.

[1] This JOURNAL, Vol. IX., pages 218–220.

The translators have added a note upon the histories of psychology which have appeared in English and also a subject index. They have added and completed references and corrected the author index, which was carelessly compiled. It is a long and wearisome task to check up all the references in the foot-notes and the translators should be forgiven for not having found all the errors of the original.

HERBERT SIDNEY LANGFELD.

HARVARD UNIVERSITY.

JOURNALS AND NEW BOOKS

MONIST. April, 1915. *The Disciples of John and the Odes of Solomon* (pp. 161–199): PRESERVED SMITH. – The Odes of Solomon were written by one of the disciples of John at Ephesus not long before A.D. 55. Ephesian parallels and references to the Odes confirm the hypothesis of their local origin; references to Johannite ceremony and belief confirm the hypothesis of their author's associations. *On the Methods of Theoretical Physics* (pp. 200–211): LUDWIG BOLTZMANN. – The tendency of modern physicists to invent and use mechanical models for the sake of visualizing their conceptions is indicated. *On the Experience of Time* (pp. 212–233): BERTRAND RUSSELL. – An attempt to discover the elements in immediate experience which lead to our knowledge of "mental time," *i. e.*, the time "which arises through relations of subject and object" and "physical time," *i. e.*, the time "which arises through relations of object and object." Certain definitions and propositions are stated and explained with the hope of forming a logical theory of time. *Newton's Hypotheses of Ether and of Gravitation from 1679 to 1693* (pp. 234–254): PHILIP E. B. JOURDAIN. – A continuation of the author's series on Newton, showing his "neutral position towards the question as to the nature of gravitation," his inclination to the belief that it was effected by the mediation of an ethereal medium, and his slighting of the question whether the attraction of two bodies was an essential property of matter. *On the Meaning of Social Psychology* (pp. 255–260): ROBERT H. GAULT. – Social psychology applies to social behavior of groups and individuals. Consciousness is social when one "takes cognizance of one's relations to others, and *vice versa*." It is not an "over-soul" or "superconsciousness." Social psychology "discusses . . . the selection and arrangement of stimuli by which those interactions that are appropriate to time and space may be brought about," and "the means by which old forms of interaction . . . are broken up" and new ones initiated. *The Overgod* (pp. 261–268): PAUL CARUS. – Poem. *Criticisms and Discussions. – On the Origin of the Hebrew Deity – Name El Shaddai*: F. M. BEHYMER. *The Nature and Perception of Things*: ALFRED H. JONES. *The Jews of Malabar*: WILFRED H. SCHOFF. *A New Era in the History of the "Apocrypha"*: CHARLES C. TORREY. *The Sabians*: PAUL CARUS. *Sir John Herschel on Hindu Mathematics. Tel*: QUINTIN WADDINGTON. *Motor Relations of Speech and Idea*: T. H. EVANS. *Book Reviews.* AUGUSTUS DE MORGAN, *A Budget of Paradoxes*: Edited by DAVID EUGENE SMITH.

THE PHILOSOPHICAL REVIEW. May, 1915. *Philosophy in France, 1913–14* (pp. 245–269): A. LALANDE. – The first part of this paper is a tribute to the work of the late Louis Couturat. Then follow general philosophy, esthetics, and psychological philosophy. The esthetic section is peculiarly rich in works of importance and interest. *Bergson and Science* (pp. 270–287): L. E. AKELEY. – Bergson's conception of creativeness has done much to weaken the finality of science. *Kant's Relation to Hume and Leibnitz* (pp. 288–296): NORMAN KEMP SMITH. – Kant's problem was "to reconcile Leibnitz's view of the function of thought with Hume's proof of the synthetic character of the causal principle." *Principles of Voluntarism* (pp. 297–313): H. W. WRIGHT. – The theory of knowledge has developed an opposition between the material world and the spiritual world which, "since it goes back to the will itself, can be removed only by activity of volition. It will be removed only when the order of movements is experienced as affording complete satisfaction to the system of personal interests" and the attainment of this is a practical, not a theoretical problem. *Reviews of Books:* J. Burnet, *Greek Philosophy. Part I. Thales to Plato:* W. A. HEIDEL. B. Croce, *Philosophy of the Practical, Economic, and Ethic:* J. H. TUFTS. Von Walter Strich, *Prinzipien der psychologischen Erkenntnis:* G. H. SABINE. F. Thilly, *A History of Philosophy:* C. M. BAKEWELL. *Notices of New Books. Summaries of Articles. Notes.*

Sears, Annie Lyman. The Drama of the Spiritual Life. New York: The Macmillan Company. 1915. Pp. xxiv + 495. $3.00.

NOTES AND NEWS

A LIST of members of the teaching and scientific staffs of universities, technical schools, etc., of the United Kingdom with the British army is given in a recent number of *Nature*. Among those who are thus engaged are C. S. Myers, lecturer in experimental psychology at Cambridge; G. H. Turnbull, assistant lecturer in education in the University of Liverpool; W. Brown, reader in psychology in King's College, London; F. Aveling, lecturer in synthetic psychology, and C. Spearman, professor of philosophy of mind and logic in University College, London.

DR. BENJAMIN W. VAN RIPER, formerly assistant professor at Boston University, who left that institution because of theological controversies, has accepted a position in the psychological department of the State College of Pennsylvania.

DR. EMIL LASK, associate professor of philosophy at Heidelberg, and Dr. Waldemar Conrad, docent for philosophy at Halle, have been killed in the war.

MR. EPHRAIM E. ERICKSEN, principal of Murdock Academy, has been elected assistant professor of philosophy in the University of Utah.

DR. H. S. LANGFELD, of Harvard University, has been promoted to the grade of assistant professor.